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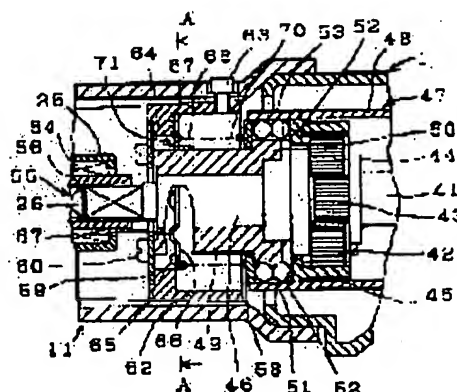
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(54) POWER TOOL

(57)Abstract:

PURPOSE: To provide so that a tool properly act on a workpiece and enable an operator work in an easy posture, in a power tool for machining the workpiece by way of transmitting the turning force of an electric motor mechanically to each tool.

CONSTITUTION: A positioning member 66 is held by a power side housing 1 with a built-in electric motor movably in the axial direction, while this positioning member 66 is pressed to another positioning member 62 fixed to a working side housing 11 provided with a tool and its driving mechanism by dint of a spring 70, and both these casings 1 and 11 are rotated by two engaging parts 65 and 67 on the circumference of a circle installed these two positioning members 62 and 66 and they are coupled together and clamped tight.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the power tool which processes cutting, punching, etc. using the turning effort of a motor, and a power tool with the function in which the phase the original working side which includes a motor in detail, and by the side of processing containing a tool can be changed into arbitration.

[0002]

[Description of the Prior Art] A motor is built in hand-held housing, the power tool which transmits to the tool which has arranged the turning effort ahead [housing] mechanically, and performs necessary processing is known widely, and housing by the side of processing which supported a tool and its drive is being fixed to housing of a original working side.

[0003] As opposed to the medial-axis line of housing of a original working side with which the tool supported by housing by the side of processing is represented with the center of rotation of a motor Namely, a fixed phase, The workpiece which is considered as the configuration installed in the direction, therefore is put on the narrow location, and various postures, When processing it into the workpiece put on the direction, in order to make a tool act on a workpiece proper, the whole power tool must be leaned to the include angle which an operator cannot operate easily in many cases.

[0004] Then, making a processing side rotatable to a original working side so that a tool can be made to act proper to a workpiece is considered about the oil pressure tool, having housing of a original working side in the condition of being easy to operate an operator (refer to JP,3-2336,Y). The oil-pressure tool currently indicated by this official report is the configuration which carried out [rotation freedom] sequential connection of the processing side on the axis of a right angle to said medial-axis line on a connection object at rotation freedom about a connection object on that medial-axis line mutually at rotation freedom, i.e., a original working side, with the connection object which arranges the processing side containing the original working side containing a hydraulic pump, a tool, and its oil hydraulic cylinder for a drive on the same medial-axis line, and has oil passage for these.

[0005] therefore, the case where it is a tool like a cable cutting cutting edge from which the direction of the force changes according to processing actuation, for example even if effective [like] when processing actuation is simple in an one direction although according to this configuration straight-line ***** of the punch which is a tool is carried out by the oil hydraulic cylinder and punching is performed — rotation — since the number of the free connection sections is two, are easy moving a processing side, and un-arranging [of it being unstable and being hard operating it] is generated. Moreover, it is inapplicable to the power tool to which it is restricted to what about [that an overall length becomes long so much] and this thing uses as the medium of power transfer of a fluid since a original working side and processing side separates mutually with a connection object and it is arranged, and the turning effort of a motor is made to transmit mechanically in a tool.

[0006]

[Problem(s) to be Solved by the Invention] In the power tool which the technical problem which this invention tends to solve transmits the turning effort of a motor to a tool mechanically, and performs necessary processing The phase of a tool is changed into arbitration on the medial-axis line of a original working side. Various postures of a workpiece, It is the point of having been forced the

inconvenience of working by leaning to the include angle which there is no connection means the original working side on which a tool can be made acting with proper and sufficient stability in the condition of being easy to operate an operator corresponding to a direction, and by the side of processing, therefore is hard to operate it, in many cases.

[0007]

[Means for Solving the Problem] This invention solves said technical problem, and without lengthening an overall length as compared with the former, a original working side and a processing side are made rotatable on a medial-axis line, and it aims at offering the power tool on which a tool can be made to act with proper and sufficient stability in the condition of joining together firmly and being easy to operate it with the phase of arbitration.

[0008] Namely, in order to make the aforementioned purpose attain, this invention is set to the power tool which has processing section housing which has been arranged motor unit housing having a motor, and ahead [its] as the first means, and supported a tool and its drive. It is held movable. it has much engagement sections on the periphery [housing / two] centering on the output shaft of a motor, while fixes to one housing -- having -- another side -- another housing -- the direction of an axis -- with a spring in the engagement direction It joined together mutually according to the baffle device which consists of two energized positioning members, and motor unit housing and processing section housing were made rotatable by these. moreover, the output shaft of a motor and the input shaft of a drive -- these -- the direction of an axis, while joining together mutually with a movable shaft coupling [in / as the second means / said power tool] It joins together mutually according to the baffle device which consists of two positioning members which have much engagement sections on the periphery [housing / two] centering on an output shaft, are fixed to each housing, respectively, and engage and release by the direction motion of an axis of housing. and a spring means to make an integrated state maintain a baffle device is acted on two housing -- making -- these -- motor unit housing and processing section housing -- mutual -- the direction of an axis -- it was presupposed that it is movable and rotatable.

[0009]

[Function] If a motor is operated, through an output shaft and an input shaft, a drive will drive a tool and will perform necessary processing to a workpiece. In the case of the first means, if processing section housing is rotated to motor unit housing, after the positioning member of a movable side having geared to the positioning member of a fixed side, and making rotate by repeating engaging and releasing of the section and carrying out necessary include-angle rotation, gearing and the section's having joined together mutually, two housing of each other is fixed with a necessary phase. Since in the case of the second means a baffle device will dissociate if the spring force is overcome in the direction pulled apart from motor unit housing and processing section housing is pulled to it, necessary include-angle rotation of the processing section housing is carried out in the condition, it returns according to the spring force, and a baffle device is combined again. It can put on the condition of being easy to operate motor unit housing by these, and processing section housing can be put on the condition that a tool acts on a workpiece with proper and sufficient stability. [0010]

[Example 1] In drawing 1 which showed the whole power tool concerning this example, if the example of the first invention indicated to claim 1 with reference to drawing 1 thru/or drawing 4 is explained, the motor unit housing 1 will make a right angle project mostly, will have the handle 2 which built in the controller, and will be started and stopped by the motor 3 with the trigger-type switch 5 while it contains the motor 3. Moreover, the processing section housing 11 contains the drive 18, and the end face section of the processing section housing 11 put it densely rotatable, and it has fitted into the point of the motor unit housing 1 while the tool 12 for consisting of a stationary knife 13 and a movable cutting edge 14, and cutting a cable, a wire or a bar, a tubing material, etc. is made to project to the tip front and it has it.

[0011] The stationary knife 13 is fixing the base to the covering object 19 which fixed at the tip of the processing section housing 11, and it is carrying out connection support of the movable cutting edge 14 rotatable by the pin 15 at the point while it has cutting cutting-edge 13a of a radii form. The movable cutting edge 14 has a radii form outside periphery centering on cutting cutting-edge 14a of a radii form and the pin 15 which face cutting cutting-edge 13a of a stationary knife 13, and this periphery covers an overall length and it forms the serrate tooth part 16.

[0012] The transmission arm 22 which the bracket 20 which consists of two parallel plates which attached the drive 18 in the covering object 19 with reference to drawing 1 and drawing 2 was made to support rotatable by the support pin 21. The drive arm 24 which engages with the transmission pin 23 implanted in this transmission arm 22 loosely, and carries out straight-line reciprocation. The input shaft 26 built in the processing section housing 11 at ** surrounded in support of both ends by casing 25 and the covering object 19 by which built-in immobilization was carried out at these at rotation freedom. The follower block 30 which carries out straight-line reciprocation along with the guidance 29 which fitted into the cam 27 prepared in the input shaft 26 on both sides of bearing 28 at rotation freedom, and was prepared between the covering objects 19. It is the configuration which consists of a spring 34 which made the delivery lever 33 and feed dog 32 which have the feed dog 32 which is attached rotatable by the attachment pin 31 at the transmission arm 22, and engages with a tooth part 16 act on the delivery lever 33 in the direction made to engage with a tooth part 16. The drive arm 24 has fixed to the follower block 30. Moreover, the inversion prevention pawl 36 supported to rotation freedom by the pin 35 is energized by the bracket 20 with a spring 37, and it is engaging with the tooth part 16.

[0013] And when an input shaft 26 rotates, the follower block 30 carries out straight-line reciprocation, the drive arm 24 prolonged in the reciprocation direction carries out both-way rocking of the transmission arm 22, and, thereby, only the eccentricity of a cam 27 is made to reciprocate on the delivery lever 33. The movable cutting edge 14 is moved to an illustration clockwise rotation centering on a pin 15 in the stroke to the illustration lower part of the delivery lever 33, and the movable cutting edge 14 is fixed by the inversion prevention pawl 36 in the stroke which returns to the illustration upper part. Therefore, the movable cutting edge 14 rotates little by little with rotation of an input shaft 26, and it comes to cut completely [it is deep and / ***** and the last target] to the workpiece which was surrounded with the cutting cutting edges 13a and 14a which faced each other and which it closed, and the doubling part became narrow gradually, and was put there. After cutting can be closed by rotating the movable cutting edge 14 to an illustration clockwise rotation manually, can open a doubling part wide, can apply a stationary knife 13 to a workpiece, and can make a tooth part 16 engage with the delivery lever 33 and the inversion prevention pawl 36 further.

[0014] Next, with reference to drawing 1, drawing 3, and drawing 4, the motor shaft 41 of a motor 3 equips the axis end with the main sun gear 43 of the epicyclic gear-type reducer 42, and the epicyclic gear 44 is attached in the axis end of the output shaft 46 on the same medial-axis line as the motor shaft 41. This reducer 42 is built in the casing section 48 of the shape of a cylinder by the side of the end face of the drive block 47 which the end face was fixed by the motor 3, was prolonged to the front, and was made to project from the apical surface of the motor unit housing 1 to the front, and to the bearing 49 inserted in the processing section housing 11 by the side of a tip, the output shaft 46 was supported by rotation freedom and has penetrated it.

[0015] In the step 50 which shifts to bearing 49 from the casing section 48 of the drive block 47, it has two or more maintenance holes 51 penetrated forward and backward by circumferential direction regular intervals, and by inserting the globular form stopper 53 fitted in the maintenance hole 51 in the retention groove 52 which was made to correspond to the side face of the periphery sun gear 45 of a reducer 42 with the maintenance hole 51, and was formed in it, it holds so that the periphery sun gear 45 may not be rotated.

[0016] It is arranged on a medial-axis line with same output shaft 46 of a motor 3 and input shaft 26 of a drive 18, and is mutually combined by the shaft coupling 55. the sleeve 56 with which this shaft coupling 55 was supported by the casing 25 of a drive 18 by bearing 54 at rotation freedom -- the axis end section of an output shaft 46 and an input shaft 26 -- baffle means, such as a key and a spline, -- pivotable to one, and each ** -- the direction of an axis -- fit in movable and pass a drive 18 in the turning effort of a motor 3 -- it is the configuration transmitted to a tool 12.

[0017] While the ring-like thrust receptacle member 58 has fitted into the bearing 49 of the drive block 47 in piles at the step 50, the ring-like ***** member 59 ***** to the apical surface of this bearing 49, and it is being fixed to it by 60.

[0018] On the other hand, the cylinder-like positioning member 62 is inserted in the end face section of the processing section housing 11, it *****, 63 is fixed, the sense annular protruding edge 64 while it was prepared at the tip of this positioning member 62 has surrounded bearing 49, and that apical

surface is in contact with the ***** member 59. The engagement section 65 which consists of parts for many crevice of circumferencial direction regular intervals is formed in the end face side of the annular protruding edge 64.

[0019] moreover, the tabular piece 68 of a foot which the positioning member 66 of the shape of a ring the engagement section 67 which consists of three projections was made to protrude on in the radiation direction by circumferencial direction regular intervals in large numbers surrounds bearing 49 to an outside periphery, and is arranged in it, and the outside peripheral surface of bearing 49 cuts off from this positioning member 66, and is prolonged along with flat side 49a -- the positioning member 66 -- bearing 49 -- the direction of an axis -- although it is movable, it is made to hold impossible [rotation] And the spring 70 of a compression coiled form is inserted in between the thrust receptacle member 58 and the positioning member 66, it fits into the engagement section 65 which consists of a part for a crevice, the positioning member 66 gears to the positioning member 64, and the pressure welding of the engagement section 67 which consists of a projection with this spring 70 is carried out in the condition. Therefore, the positioning member 66 works as a spring receptacle, and the thrust receptacle member 58 works as ***** of a spring receptacle and the globular form stopper 53, and further, the ***** member 59 commits it for it so that the positioning member 62 may be caught and the processing section housing 11 may not extract from the original working side housing 1.

[0020] the aforementioned drive block 47 and a motor 3 -- minding -- the motor unit housing 1 -- the direction of an axis -- the positioning member 66 held movable and the positioning member 62 directly fixed to the processing section housing 11 -- further a spring 70 The baffle device 71 which rotates as a core and combines two housing 1 and 11 for the medial-axis line of the motor shaft 41, an output shaft 46, and an input shaft 26 with the phase of arbitration equal to the integral multiple of the pitch of the engagement section 65 is constituted.

[0021] This example of such a configuration cuts workpieces, such as a cable which was made to carry out straight-line reciprocation of the drive arm 24, rotated the movable cutting edge 14 little by little through the reducer 42, the output shaft 46, the shaft coupling 55, and the input shaft 26 as explained previously, and was put between stationary knives 13, by grasping a handle 2, turning on a switch 5 and operating a motor 3.

[0022] In order to make a tool 12 act on a workpiece proper depending on the location on which the workpiece is put or the posture placed, or a direction, for example, if in charge of cutting of long objects, such as a cable, it is required to turn the direction of a tool 12 of operation so that a stationary knife 13 and the movable cutting edge 14 may be located in a right angle to a long object axis. in such a case -- if the processing section housing 11 or the motor unit housing 1 is rotated in the predetermined direction -- the positioning member 62 of the processing section housing 11 -- the direction of an axis of the motor unit housing 1 -- it rotates to the movable positioning member 66, and the actuation which serves as the engagement section 65 which consists of a projection from a part for a crevice and which will compress and separate from 70 if it grinds engagement section 67, and then fits in by the force of a spring 70 is repeated. Therefore, when necessary include-angle rotation was carried out, it gears and the sections 65 and 67 fit in mutually, the baffle device 71 is combined in the location, it can consider as the include angle at which an operator tends to operate the motor unit housing 1 by this, and the processing section housing 11 can be fixed with the phase to which a tool 12 acts on a workpiece with proper and sufficient stability.

[0023] In case both two both [either or] 1 and 11 is rotated and those phases are changed, an output shaft 46 and an input shaft 26 may be fixed to the motor unit housing 1 by the reducer 42 in the condition which cannot be rotated. In such a case, the follower block 30 drives according to a cam 27 with rotation of the processing section housing 11, and the delivery lever 33 is moved. For this reason, even if the movable cutting edge 14 may be moved in the direction of closing, since that motion is few, it does not have any trouble. moreover, the operation which changes the phase of two housing 1 and 11 is not only in the middle of before cutting initiation but in the middle of cutting, and a stationary knife 13 and the movable cutting edge 14 are ***** at a workpiece -- in a condition, since motions of the movable cutting edge 14 are few, actuation of changing a phase can be performed.

[0024] In addition, although one step of reducer 42 was formed in this example, it cannot be

overemphasized that two or more steps may be prepared as occasion demands. Moreover, although the periphery sun gear 45 of the epicyclic gear-type reducer 42 was fixed to the step 50 of the drive block 47 with the globular form stopper 53 in this example, you may fix by inserting in the casing section 49 tightly, the ring-like thrust receptacle member 58 may be excluded in this case, and the direct action of the spring 70 may be carried out to a step 50. Furthermore, since it was made to transmit rotation of an output shaft 46 to a drive 18 through a shaft coupling 55 and an input shaft 26 in this example, it is convenient for assembly and decomposition, or check and exchange of components, but even if it extends an output shaft 46 and unites with an input shaft 26, the purpose of this invention can be attained.

[0025]

[Example 2] Drawing 5 thru/or drawing 9 show the example of the second invention indicated to claim 2, since everything but a baffle device is the same as the example of the first invention, the explanation is omitted, and suppose that a baffle device is mainly explained.

[0026] The positioning member 158 of the shape of a ring which has the engagement section 159 which consists of many notches by circumferential direction regular intervals has fitted into the outside periphery section at the bearing 49 of the drive block 47, and this positioning member 158 is put on the step 50 with the predetermined phase by having two or more lock pins 160, and inserting a lock pin 160 in some of maintenance holes 51 of the globular form stopper 53. This positioning member 158 also has the function as ***** of the globular form stopper 53.

[0027] Moreover, the spring presser foot 161 of the shape of a ring ***** to the apical surface of the bearing 49 of the drive block 47, and it is being fixed to it by 163, and the tabular piece 162 of a presser-foot foot which the outside peripheral surface of bearing 49 cuts off from this spring presser foot 161, and is prolonged along with flat side 49a is fixed so that opposition may not move in the direction of a medial-axis line at the positioning member 158.

[0028] On the other hand, the cylinder-like positioning member 165 is inserted in the end face section of the processing section housing 11, it ****s, 164 is fixed, and the engagement section 167 which consists of much projections of circumferential direction regular intervals is formed in the sense annular-among end faces of this positioning member 165 protruding edge 166. The engagement section 167 which consists of the engagement section 159 which consists of a notch, and a projection is formed in the same pitch on the same circle, and the spring 168 of a compression coiled form is inserted between the spring presser foot 161 and the annular protruding edge 166.

[0029] The positioning member 158 fixed to the motor unit housing 1 through the aforementioned drive block 47 and the motor 3 and the positioning member 165 directly fixed to the processing section housing 11 constitute the baffle device 169 which rotates as a core and combines two housing 1 and 11 for the medial-axis line of the motor shaft 41, an output shaft 46, and an input shaft 26 with the phase of arbitration equal to the integral multiple of the pitch of the engagement sections 159 and 167.

[0030] In order to make a tool act on a workpiece proper depending on the location on which the workpiece is put or the posture placed, or a direction, it is required to turn the direction of a tool of operation so that you may make it located in a right angle to long object axes, such as a cable. In such a case, if the force of a spring 168 is overcome to the direction pulled apart from the motor unit housing 1, i.e., the front, and the processing section housing 11 is pulled to it, while the engagement section 167 to which the positioning member 165 moves to the front, and becomes one from a projection will extract from the engagement section 159 which consists of a notch, when an input shaft 26 and a sleeve 56 also move to the front at one, an output shaft 46 slips out of the sleeve 56 of a shaft coupling 55 for a while. Next, after the baffle device 169 has dissociated, only a necessary include angle rotates the processing section housing 11 or the motor unit housing 1 in the predetermined direction. The processing section housing 11 is returned toward the motor unit housing 1 according to the force of a spring 168. The baffle device 169 is combined by rotating for a while further, gearing and making it insert in the section 159, when [which faced each other] it gears, the section 159,167 shifts and gears and the section 167 of opposition is in the front face of the positioning member 158. It can consider as the include angle at which an operator tends to operate the motor unit housing 1 by this, and the processing section housing 11 can be fixed with the phase to which a tool 12 acts on a workpiece with proper and sufficient stability.

[0031] In addition, when it fixes by inserting the periphery sun gear 45 of a reducer 42 in the casing section 49 tightly by this example, the engagement section 159 which excludes the ring-like positioning member 158 and turns into a step 50 from a notch or a hole may be formed, and the positioning member 158 may be made to use also [block / 47 / drive]. Furthermore, the engagement section 159,167 can perform a design change, such as using one side as an external-tooth gearing, and enabling engagement of another side with an arbitration phase as an internal gear that what is necessary is just what moves in the direction of an axis, and engages and releases, and is prepared in the circumferencial direction at small spacing. Furthermore, this invention is applicable not only to cutting but the thing equipped with the tool which performs various processings, such as punching, compression, and bending, and its drive again.

[0032]

[Effect of the Invention] The baffle device in which the integrated state was maintained by the spring force while combining motor unit housing and processing section housing like [it is ***** and] from the above explanation in circumferencial direction many locations, Or according to this invention considered as the configuration fixed to an arbitration phase by the baffle device in which the integrated state was maintained by the spring force while engaging and releasing by the direction motion of an axis and combining motor unit housing and processing section housing in circumferencial direction many locations While being constituted without making an overall length huge, motor unit housing is turned in the include angle, i.e., direction, which an operator tends to operate. A tool can act processing section housing on a workpiece with proper and sufficient stability, and exact processing can be performed to the workpiece placed in various postures and the direction by the mechanical power from a motor, without an operator taking an impossible posture by this.

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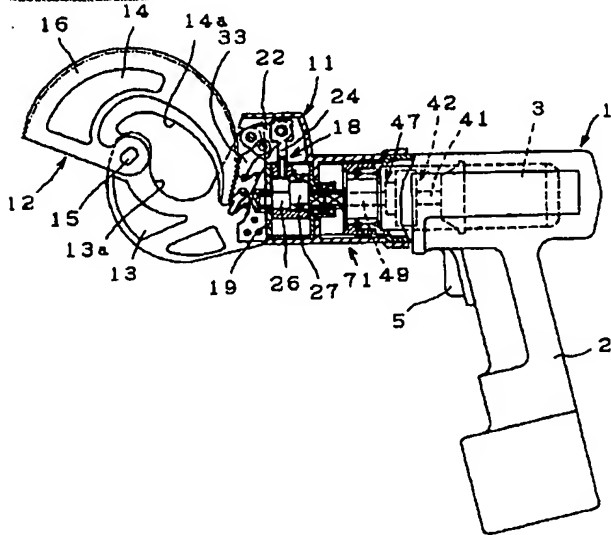
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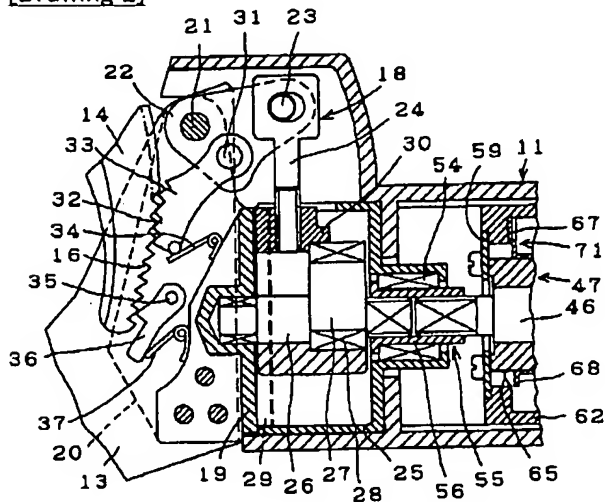
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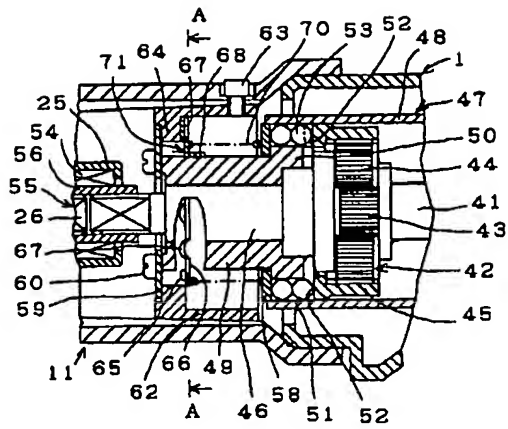
[Drawing 1]



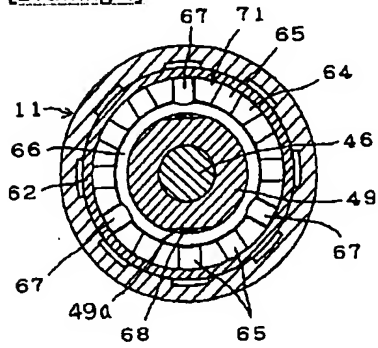
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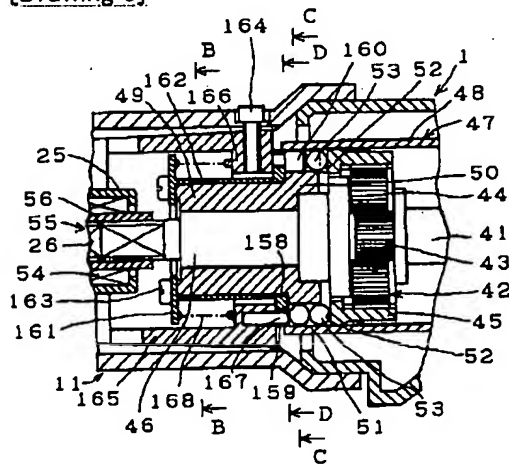
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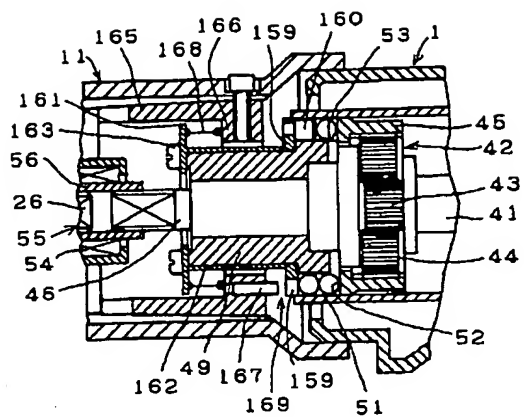
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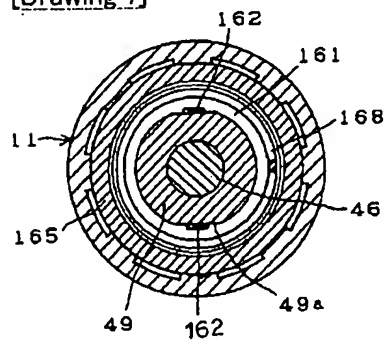
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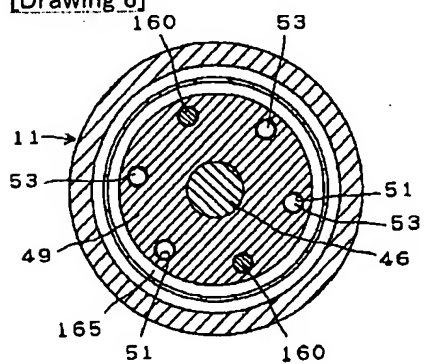
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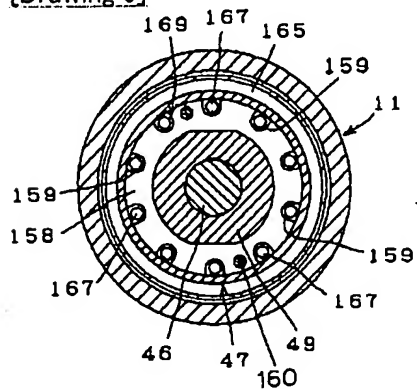
[Drawing 7]



[Drawing 8]



[Drawing 9]



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